15162

3 Hours / 100 Marks   Seat No.

Instructions : (1) *All* questions are *compulsory*.
(2) Answer *each* next main question on a *new* page.
(3) Illustrate your answers with neat sketches *wherever* necessary.
(4) Figures to the *right* indicate *full* marks.
(5) Assume suitable data, if *necessary*.
(6) Use of Non-programmable Electronic Pocket Calculator is *permissible*.

Marks

1. Attempt **any ten** of the following :   **20**

a) Define partial pressure.

b) Draw symbol of Ball Mill.

c) Write names of two catalysts used in hydrogenation reaction.

d) Define percent conversion.

e) List any four Personal Protective Equipments (PPE).

f) Convert 100 litres in cubic meter.

g) Write statement of Kik's law.

h) Define sulphonation.

i) Define yield.

j) Draw neat labelled diagram of rotameter.

k) Calculate the kilogram atoms of carbon which weighs 36 kg.

l) List any two equipments used for size separation.

2. Attempt **any four** of the following :   **16**

a) 20 grams of caustic soda (NaOH) are dissolved in water to prepare 500 ml of solution. Find the normality and molarity of the solution.

b) What is Filteration ? Give one example of filteration. Draw general symbol for batch type filter.

c) Explain with example reduction reaction. Write one name of reducing agent.

d) What is process flow sheet ? Write its three uses.

e) Explain with neat figure the working of U-tube manometer.

f) Define the following terms :

i) gram atom
ii) gram mole.

P.T.O.

Marks

3. Attempt **any four** of the following :   **16**

   a) A gas mixture contains 0.274 Kmol of HCl, 0.337 Kmol of N_2 and 0.089 Kmol of O_2 at a total pressure of 405.3 kPa. Calculate the partial pressure of each component present in a gas mixture.

   b) What is distillation ? Draw the neat labelled symbol for fractional distillation.

   c) Explain with example cracking reaction. In which industry it is widely used ?

   d) Write down the reaction involved in manufacturing of sulphuric acid. List any two catalyst used for this reaction.

   e) Explain with neat figure the working of float and tape method for measurement of liquid level.

   f) What are the modes of heat transfer ? Write name of any one equipment used for heat transfer.

4. Attempt **any four** of the following :   **16**

   a) How many moles of H_2SO_4 contains 64 kg of sulphur ?

   b) What is drying ? Draw the neat labelled symbol for spray drying unit.

   c) Explain with example hydration reaction. Write one name of catalyst used in the hydration reaction.

   d) Write down any four properties and four uses of sulphuric acid.

   e) Explain with neat figure the working of mercury in glass thermometer.

   f) 20 kg of ethyl alcohol (C_2H_5OH) are added to 120 kg of water to prepare the solution of ethyl alcohol. Find weight percent and mole percent composition of solution.

5. Attempt **any four** of the following :   **16**

   a) Define the following terms : i) Molarity   ii) Molality.

   b) Differentiate between crushing and grinding (minimum four points).

   c) Draw block diagram of 98% sulphuric acid process.

   d) Explain with neat figure working of Redwood viscometer.

   e) Prove that sum of weight fraction of components present in the binary system is equal to unity

     i.e. $\sum\limits_{i=1}^{n} x_i^1 = 1.0$.

   f) What will be the power required to crush 150 tonnes per hour of limestone i and 80% of the feed passes 50 mm screen and 80% of the product passes 3.125 mm screen ?

6. Attempt **any four** of the following :   **16**

   a) Find the equivalent weight of the following :   i) HCl   ii) H_2SO_4.

   b) Explain with neat figure the construction and working of trommel.

   c) Explain density determination by specific gravity bottle.

   d) Draw process flow sheet for manufacturing of nitric acid.

   e) Explain with neat figure four types of temperature scales.

   f) A solution of caustic soda contains 20% NaOH by weight. The density of the solution is 1.196 kg/l. Find the normality, molarity and molality of the solution.

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